

BAB XVI

16.1 Sambungan Kuda-Kuda

Output Gaya Maksimum pada Sambungan hasil ETABS

Mu := 1726.27 kgm

Pu := 13742.4 kg

Direncanakan Baut HTB $\phi 12$ BJ 41

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$\Phi_{\text{baut}} := 12 \text{ mm}$$

$$A_b := \frac{\pi}{4} \cdot 1.2^2 = 1.131 \text{ cm}^2$$

Pelat penyambung BJ 37

$f_u := 3700 \text{ kg/cm}^2$ $t_p := 1 \text{ mm}$

$$f_y := 2400 \text{ kg/cm}^2$$

- Kontrol Geser

Direncanakan Baut HTB $\phi 12$

$$V_u := \frac{P_u}{8} = 1717.8 \text{ kg}$$

$$f_{uv} := \frac{V_u}{A_b} = 1518.9 \text{ kg/cm}^2 \quad \blacksquare \leq \blacksquare \quad 0.5 \cdot 0.75 \cdot f_{ub} \cdot 1 = 1537.5 \text{ kg/cm}^2 \quad \text{OK!!}$$

- Beban Tarik (interaksi geser dan tarik)

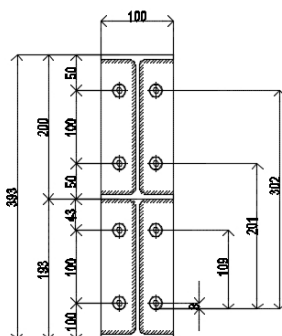
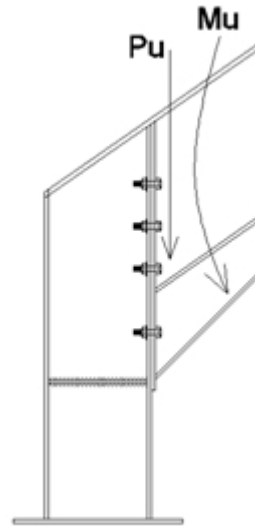
$$f_t := (1.3 \cdot f_{ub} - 1.0 \cdot f_{uv}) = 3811.1 \quad \text{kg/cm}^2 \quad \blacksquare > \blacksquare \quad f_{ub} = 4100 \quad \text{kg/cm}^2$$

$$f_t := f_{ub} = 4100 \quad \text{kg/cm}^2$$

$$T_d := 0.75 \cdot f_{ub} \cdot A_b = 3477.7 \quad \text{kg}$$

Mencari garis netral ----> anggap dibawah baut terbawah

$$a := \frac{8 \cdot T_d}{10 \cdot 2400} = 1.16 \quad \text{cm} \quad \blacksquare \leq \blacksquare \quad 4 \quad \text{cm} \quad \text{OK!!}$$



Momen rencana yang dapat dipikul sambungan

$$\Phi Mn := \frac{\left[\left(0.9 \cdot 2400 \cdot a^2 \cdot \frac{10}{2} \right) + 2 \cdot Td \cdot (0.8 + 10.9 + 20.1 + 30.2) \right]}{100} = 4457.5 \text{ kgm}$$

$$\Phi Mn = 4457.5 \text{ kgm} \quad \blacksquare \geq \blacksquare \quad Mu = 1726.27 \text{ kgm}$$

• **Sambungan Pelat dengan Balok (Sambungan Las)**

Digunakan las F_{E70XX}

Tebal las $t_e := 1 \text{ cm}$

Profil WF 200 x 100 x 5,5 x 8 BJ 37

$$h := 200 - 2 \cdot (1 + 8) = 182 \text{ mm}$$

$$A := 2 \cdot (18.2 + 10) \cdot 1 = 56.4 \text{ cm}^2$$

$$I_p := 2 \cdot \left[\left(\frac{1}{12} \cdot 18.2^3 \right) + \left[1 \cdot 56.4 \cdot \left(\frac{10}{2} \right)^2 \right] \right] = 3824.76 \text{ cm}^4$$

Akibat beban geser sentris

$$Pu = 13742.4 \text{ kg}$$

$$fu := \frac{Pu}{A} = 243.66 \text{ kg/cm}^2$$

Akibat beban momen lentur

$$Mu = 1726.27 \text{ kgm}$$

$$S_x := \frac{I_p}{10} = 382.48 \text{ cm}^3$$

$$f_h := \frac{Mu \cdot 100}{S_x} = 451.341 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{tot} := \sqrt{fu^2 + fh^2} = 512.912 \frac{\text{kg}}{\text{cm}^2}$$

Kekuatan rencana las

$$\Phi f_n := (0.75 \cdot 0.6 \cdot 70 \cdot 70.3) = 2214.45 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{total} < \Phi f_n$$

$$teperlu \geq \frac{f_{tot}}{\Phi f_n} = 0.232 \text{ cm}$$

$$aperlu \geq \frac{0.297}{0.707} = 0.42 \text{ cm}$$

Syarat :

$$a_{min} := 5 \text{ mm } (t = 10 \text{ mm})$$

$$a_{effmax} := 0.707 \cdot \frac{3700 \cdot 0.5}{70 \cdot 70.3} = 0.266 \text{ cm (las di badan)}$$

$$a_{effmax} := 1.41 \cdot \frac{3700 \cdot 0.7}{70 \cdot 70.3} = 0.742 \text{ cm (las di daun)}$$

maka dipakai $a = 5 \text{ mm} > a_{perlu} = 4.2 \text{ mm}$

- **Kontrol Pelat Sambung**

Pelat penyambung BJ 37

Direncanakan baut BJ 41

$$f_u := 3700 \text{ kg/cm}^2$$

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$f_y := 2400 \text{ kg/cm}^2$$

$$d_b := 1.2 \text{ cm}$$

$$t_p := 1 \text{ cm}$$

$$A_b := \frac{\pi}{4} \cdot 1.2^2 = 1.131 \text{ cm}^2$$

Luas bidang geser

$$L := 20 \text{ cm}$$

$$A_{nv} := (L - 2 \cdot d_b) \cdot t_p = 17.6 \text{ cm}^2$$

Kuat Rencana

$$\Phi P_n := 0.75 \cdot (0.6 \cdot f_u \cdot A_{nv}) = 29304 \text{ kg} \quad \blacksquare > \blacksquare \quad P_u = 13742.4 \text{ kg} \quad \text{OK!}$$